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were seen in the course of a day's walk. The plant probably attains its greatest density of distribution in this locality.

The plant derives all its food material from humus by the aid of a fungus living in the roots, which form a small compact mass no larger than a golf ball. Any disturbance or departure from the conditions offered by a primitive forest would be detrimental to the growth and development of both the *Pterospora* and the fungus with which it is allied. It will, therefore, probably become extinct in eastern United States, but will retain its foothold among the western mountains until its habitats are ravaged by fire, or by clearing of the forest.

In its habitat in the Mission Mountains, *Pterospora* occurs more abundantly in a given locality than any other known chlorophyllless seed plant.

## TWO NEW BUSH CLOVERS (*LESPEDEZA*)

BY EUGENE P. BICKNELL

It may well be doubted whether the notable activity of the last few years in the critical exploration and study of our common flora has yet achieved anything more than a very good beginning.

A few years ago the discovery of a new eastern species was hailed as a botanical event. Now, no season passes but a numerous progeny of new species is transplanted from nature into the pages of our botanical serials, and still in the background many others await their turn. The doors to new discovery, thought by the last generation of botanists to be barred and locked by our earlier manuals, have been easily pushed wide open, and, lo, we find a beginning where our predecessors seemed to find the end.

Among the species of *Lespedeza* that have all this time been awaiting recognition, two well-marked eastern plants may here be distinguished.

### ***Lespedeza velutina***

Erect, stout, bushy-branched above or sometimes simple, 0.5–1.25 meters high, the appressed-ascending branches mostly

not over 10–15 cm. long, densely velvety-pubescent throughout, the younger parts soft-canescens. Leaves numerous, crowded, ascending or subappressed, on short petioles mostly 3–5 mm. long, shorter than or slightly exceeding the very narrow, recurved-spreading stipules; leaflets oblong, somewhat narrowed to the base, rounded to the short-mucronulate apex, 25–40 mm. long, 8–18 mm. wide, densely tomentose-ciliate, the odd leaflet usually slightly the largest on a foot-stalk longer than the petiole: inflorescence capitate in dense clusters axillary to the upper leaves or crowded at the ends of stem and branches; heads ovoid or broadly ovoid, subsessile or on obscure petioles becoming 10–15 mm. long: corolla 6.5–8.5 mm. long, subequal with the calyx lobes; standard pure white with a crescent of suffused pink-purple streaks in the middle, oblong and partly conduplicate, nearly horizontal; wings as long as the standard, linear-oblong, narrowed to the tip, white; keel shorter, purplish-margined toward the tip: calyx-lobes linear-lanceolate, attenuate, exceeding the corolla, becoming 8–10 mm. long, densely hoary-pilose: pod oblong or narrowly rhomboid, gradually narrowed to each end, 5–6 mm. long, mostly 2.5 mm. wide, densely short-pubescent, much shorter than the calyx-lobes.

NEW YORK: Woodlawn, border of low thicket, beginning to flower from the middle to the end of August.

MASSACHUSETTS: Beach Bluff, August, 1889, *Wm. E. Wheelock*.

Type from Woodlawn, N. Y., August 28, 1898, flowers; September 25, 1898, fruit: in herb. New York Botanical Garden.

This species, although beautifully distinct from *L. capitata* Michx., resembles that common species so closely in general habit that it is not surprising it has remained undistinguished. The soft velvety pubescence covering both surfaces of the leaves and showing nothing of the appressed and silky character of that of *L. capitata* and its more western variety *sericea*, will alone always easily distinguish *L. velutina* from these near relatives.

It should be noted further that its flowering time is from two to four weeks later than that of *L. capitata*.

### ***Lespedeza Brittonii***

Densely soft cinereous-pubescent or tomentose, especially above, with finally spreading hairs, becoming sparsely pubescent below, the upper surface of the leaves thinly subappressed-pubes-

cent to glabrate : roots strong and greatly elongated : stems wand-like and widely ascending, sometimes forming dense growths several yards in extent, 0.6–1.25 meters long, simple or with numerous, short, subappressed branches above, sometimes with longer ascending branches from near the middle : leaves rather light green, thickish, on short petioles mostly 2–10 cm. long, the joints of the leaflets, especially, cinereous-tomentose ; pubescence of lower surface short-tomentulose, that of the midrib denser and more spreading, the margins tomentulose-ciliate ; leaflets oblong, rounded or somewhat narrowed to base and apex, mucronulate, 20–45 mm. long, 8–20 mm. wide, the odd leaflet slightly the largest and on a petiolule 3–10 mm. long : flowering portion of stem elongated and bearing short stiffly subappressed branches and reduced leaves : cleistogamous flowers clustered on short lateral branches : petaliferous flowers short-spicate at the ends of slender peduncles 2–5 cm. long subterminal on the stem and sometimes on the branches ; spikes closely flowered, shorter than their peduncles, short-oblong or globose, sometimes appearing capitate, 10–20 mm. long : flowers very short-petioled or subsessile : corolla 6–8 mm. long, much surpassing the calyx, whitish and pink tinged with purple, which deepens to a streaky purple spot at the base of the standard : calyx-lobes linear-attenuate, 4–5 mm. long : pod ovate or oblong-ovate, abruptly acute to somewhat acuminate, 4.5–6.5 mm. long, twice the length of the calyx-lobes or less, thinly puberulent all over with short subspreading or tomentulose hairs.

MASSACHUSETTS : Boston, Muddy Pond Hills, September 10, 1892, *Edwin Faxon*, herb. Columbia Univ.

NEW YORK : Near Bronxville (two stations), in dry soil outside the borders of woods, flowering in late August and early September.

NEW JERSEY : Quaker Bridge, *C. Pickering*, Herb. Acad. Nat. Sci. Philadelphia.

Type from Bronxville, N. Y., September 4, 1893, flowers ; September 16, 1893, fruit : in herb. N. Y. Botanical Garden.

Somewhat intermediate in characters between *L. Nuttallii* Darl. and forms of *L. procumbens* Michx., but larger than either and well marked throughout as perfectly distinct.

The much smaller and normally trailing *L. procumbens* scarcely needs close comparison. *L. Nuttallii* is a smaller, normally erect and much less pubescent plant, with more delicately and freely branched inflorescence, longer and more slender petioles, thinner and broader leaflets, which are paler and appressed-pubescent beneath, more scattered inflorescence of smaller flowers in smaller

and looser less strongly pedunculate spikes, longer-pedicelled pods, which are longer, narrower and more acuminate, with longer and more or less persistent instead of early deciduous styles, and with the pubescence coarsely appressed-hairy instead of thinly tomentulose.

It would appear that so well distinguished a plant, if not a rare species, would have been often collected unless by reason of its very brief flowering period it has escaped notice when in flower and at other times has been passed over for some common *Meibomia* which in appearance it strongly suggests.

## NOTES ON LIRIODENDRON LEAVES

BY EDWARD W. BERRY

(WITH PLATES I AND 2)

The accompanying plates represent leaves borne near flowering buds, either foliar flower-bud-scales or the next older leaf than the bud-scale on full grown trees. Those figured on plate 1 are one-fourth natural size, and those on plate 2 are two-thirds natural size. They all serve to confirm the view previously affirmed\* that the diversion of sap for other purposes causes the abbreviated Liriophyllum-like leaf-form in this genus (*i. e.*, *Liriodendron*). The broadly-winged stipular appendages of the leaf-stalk are much commoner this year (1901) than I have ever before observed them and it is quite possible that this excessive stipular development may be a correlative of the long continuous wet weather which was such a remarkable feature of the past spring. Further support of this view is furnished by the ordinary stipules which seem to average much larger in size than usual.

In some of the specimens the stipules are merely adnate, and doubtless would, in a less wet season, become entirely separated, splitting away from the petiole when it straightened, as do the winged petiolar appendages in some species of *Magnolia*. Other of the specimens however show evidence of a true persistent union between petiole and stipule.

Of Figs. 3, 6, 7, 8, 11, and 12, the only one that need be especially mentioned is the leaf shown in Figs. 6 and 7. Fig. 6 shows the entire leaf with its winged petiole, and Fig. 7 the en-

\* Bull. Torr. Club, 28. S. 1901.